



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/927,118	08/10/2001	Donald Pierce		4266

21186 7590 05/04/2004

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.  
P.O. BOX 2938  
MINNEAPOLIS, MN 55402

EXAMINER

BRAUTIGAM, ALYSA N

ART UNIT PAPER NUMBER

2676

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/927,118

Applicant(s)

PIERCE ET AL.

Examiner

Alysa N. Brautigam

Art Unit

2676

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed with respect to claims 1, 19, 23, and 30, see pages 16-20 of applicant's amendment, dated 20 February 2004, have been fully considered but they are not persuasive.
2. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a first combined image and a second combined image where the first and second combined images are implied to be, according to applicant's arguments, captured images) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).
3. Applicant's arguments with respect to claims 1, 19, 23, and 30, see pages 16-20 of applicant's amendment, dated 20 February 2004, have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Objections***

4. In regards to claims 29 and 54, applicant's amendments, see page 12 under "Claim Objections" heading, filed 20 February 2004, with respect to Claim Objections

Art Unit: 2676

have been fully considered and are persuasive. The objections to claims 29 and 54 have been withdrawn.

5. Claim 29 is objected to because of the following informalities: In particular, the claim has been amended to read, "prior to merging the image" of claim 23. However, claim 23 has a "combining" method and not a "merging" method. . Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. In regards to claim 10, applicant's arguments, see page 15, line 24 through page 16, line 7, filed 20 February 2004, with respect to the 35 USC § 112 Claim Rejection have been fully considered and are not persuasive. The statements advanced in paragraph 2 of the Non-Final Rejection, are incorporated herein. In particular, applicant cites several definitions for the term "equirectangular" which are quite clear and precise. Further, it is agreed that the term "equirectangular" is well know to those of ordinary skill in the art; however, it is unclear how an image is "**at least partially** equirectangular." Based on the definitions supplied by applicant, an image either **is** or **is not** equirectangular and, as applicant points out on page 16, lines 6-7 of the amendment, the specification states the image **is** equirectangular (page 10, lines 20-23 of the specification).

7. In regards to claims 21 and 22, applicant's arguments, see page 27 through page 14, line 15, filed 20 February 2004, with respect to the 35 USC § 112 Claim Rejections have been fully considered and are not persuasive. The statements advanced in paragraph 3 of the Non-Final Rejection, are incorporated herein. It is agreed that the specification supports the "displayed images claimed by Applicants can be created by a process in which the first and second combined images are created and then enhanced by images obtained from other image capture units..." and that the specification further supports the "representation (e.g., display) of 180 degrees and more of a scene using the disclosed apparatus, systems, and methods." However, the aforementioned claims are directed only toward a specific component of the system and the specification does not support the specific language of the claim. - Taking claim 21 for example, "said first combined image displays at least about 180 degrees of a scene." Referring back to claim 19, upon which claim 21 is dependent, it is noted that "said first combined image" is only the combination of "a first image captured with said image capture device with a second image captured with said second image capture device." In claim 21, the language of the claim does not suggest that "the first and second combined images are created and then enhanced by images obtained from other image capture units." Referring back to the statements advanced in paragraph 3 of the Non-Final Rejection, given that "said first combined image" is the combination of only two images generated from only two image capture devices, it is unclear how the combination of only two images could display "at least about 180 degrees of a scene," as disclosed in claim 21,

Art Unit: 2676

nor how the combination of only two images could display "at least about 300 degrees of a scene."

8. In regards to claim 29, applicant's amendments, see page 7, filed 20 February 2004, with respect to the rejection(s) of claim(s) 29 under 35 USC § 112 Claim Rejections have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

9. In regards to claim 54, applicant's amendments, see page 10, filed 20 February 2004, with respect to claim 54 have been fully considered and are persuasive. The 35 USC 112, first paragraph, objection to claim 54 has been withdrawn.

10. In regards to claims 41, 42-46 and 57-58, applicant's amendment, see page 9, filed 20 February 2004, with respect to claim 41 has been fully considered and is persuasive. While applicant's argument on page 14, line 16 through page 15, line 7, is noted, it does not address the basis of the rejection as advanced in paragraph 4 of the Non-Final Rejection, i.e., how a portion of a single monoscopic image, **taken alone as claimed**, is able to provide a stereoscopic image. However, applicant's amendment to claim 41 is sufficient to overcome the rejection. Therefore, the 35 USC 112, first paragraph, rejection of claims 41, 42-46 and 57-58 has been withdrawn.

11. In regards to claim 28, applicant's amendments, see page 6, filed 20 February 2004, with respect to claim 28 have been fully considered and are persuasive. The 35 USC 112, second paragraph, rejection of claim 28 has been withdrawn.

12. In regards to claim 47-50 and 52-54, applicant's amendments, see page 10 and page 16, line 8-10, filed 20 February 2004, with respect to claims 47-50 and 52-54 have

been fully considered and are persuasive. The 35 USC 112, second paragraph, rejection of claims 47-50 and 52-54 have been withdrawn.

13. In regards to claim 51, applicant's amendment, see page 10, filed 20 February 2004, with respect to the rejection(s) of claim(s) 51 under 35 USC 112, second paragraph have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the amendment to the claim. In particular, claim 51 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 51 recites the limitation "moving stereoscopic, panoramic image" in line 1 in reference to the imaging system of Claim 40. Claim 40 contains reference to a "stereoscopic, panoramic motion picture" but not a "moving stereoscopic, panoramic image." Therefore, there is insufficient antecedent basis for this limitation in the claim. For the purpose of further review, it will be assumed the applicant meant the claim to read "stereoscopic, panoramic motion picture."

#### ***Claim Rejections - 35 USC § 102***

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

15. Claims 23-24, 27-28, 30-31, 34, 38, 40-46, 49, 51, 54, and 55-58 are rejected under 35 U.S.C. 102(e) as being anticipated by Peleg et al. (6,665,003).

16. In regards to Claim 23, Peleg disclose a method for producing a stereoscopic image comprising: obtaining first, second, and third images (Figure 6; column 8, lines 31-34 and 49-64 disclose the mounting of a plurality of cameras including at least a first, second, and third camera and the capture of images with those cameras such that a first image, second image, and third image are obtained); combining a first portion of said first image with a portion of said second image to produce a first combined image and combining a second portion of said first image with a portion of said third image to produce a second combined image (column 6, lines 20-51 and column 8, lines 13-22 disclose the combining of images as disclosed by applicant in the specification [page 6, lines 3-15] and as claimed, that is, a first portion of said first image [the left image plane of the first image] is combined with a portion of said second image [the left image plane of the second image] and a second portion of said first image [right image plane of the first image] is combined with a portion of said third image [right image plane of the third image] where the technique used for combining is "any convenient mosaicing technique [column 8, lines 20-22] and the first image corresponds to that captured with camera 51(2), the second image corresponds to that captured with camera 51(3), and the third image corresponds to that captured with camera 51(1)); and displaying said first combined image and said second combined image in a manner which produces a



Art Unit: 2676

stereoscopic image (column 8, lines 11-13 disclose the purpose of this image combining as to produce a stereo image pair; column 11, lines 38-42).

17. In regards to Claim 24, Peleg discloses the method of Claim 23, further comprising picking up said first image, said second image, and said third image from a plurality of points defining an arcuate line (Figure 6).

18. In regards to Claim 27, Peleg discloses the method of Claim 23, further comprising displaying a first plurality of combined images in sequence and a second plurality of combined images in a sequence to produce a stereoscopic motion picture (column 13, lines 20-24).

19. In regards to Claim 28, Peleg discloses the method of Claim 27, wherein said stereoscopic motion picture represents at least about 180 degrees of a scene (Figure 6 and column 10, lines 61-66).

20. In regards to Claim 30, Peleg discloses an imaging system comprising: a first image capture unit to capture a first image, a second image capture unit to capture a second image, a third image capture unit to capture a third image (Figure 6; column 8, lines 31-34 and 49-64 disclose the mounting of a plurality of cameras including at least a first, second, and third camera and the capture of images with those cameras such that a first image, second image, and third image are obtained); a processing unit operationally coupled to the first, second, and third image capture units to receive the first, the second, and the third images (Figure 6, item 12 discloses the "Panorama Mosaic Image Generator" and column 8, lines 4-22 disclose one embodiment of the processing unit as recording the images where it is inherent that if it is recording the

images, it is receiving the images), wherein a first portion of the first image can be combined with a portion of the second image to provide a first combined image and a second portion of the first image can be combined with a portion of the third image to provide a second combined image (column 6, lines 20-51 and column 8, lines 13-22 disclose the combining of images as disclosed by applicant in the specification [page 6, lines 3-15] and as claimed, that is, a first portion of said first image [the left image plane of the first image] is combined with a portion of said second image [the left image plane of the second image] and a second portion of said first image [right image plane of the first image] is combined with a portion of said third image [right image plane of the third image] where the technique used for combining is "any convenient mosaicing technique [column 8, lines 20-22] and the first image corresponds to that captured with camera 51(2), the second image corresponds to that captured with camera 51(3), and the third image corresponds to that captured with camera 51(1); column 13, lines 59-65); and the first and second combined images can be displayed to provide a stereoscopic image (column 8, lines 11-13 disclose the purpose of this image combining as to produce a stereo image pair; column 11, lines 38-42).

21. In regards to Claim 31, Peleg discloses the imaging system of Claim 30, wherein said first, the second, and the third image capture units are located approximately equidistant from each other along a substantially arcuate path (Figure 6 shows the equidistant locations along the "substantially arcuate path" and column 8, lines 31-34).

22. In regards to Claim 34, Peleg discloses the imaging system of Claim 30, wherein a field of view associated with said first image capture unit overlaps a field of view

associated with said second image capture unit by an overlap amount and wherein the field of view associated with said second image capture unit overlaps a field of view associated with said third image capture unit by the overlap amount (Figures 4 and 6 disclose the overlap in the field of view between adjacent images where, in Figure 6, the overlap between the first image capture device [51(1)] overlaps the field of view of the second image capture device [52(2)] and the field of view of the second image capture device [52(2)] overlaps the field of view of the third image capture device [52(3)]).

23. In regards to Claim 38, Peleg discloses the imaging system of Claim 30, wherein said plurality of said first and second combined images are displayed in sequence to convey motion (column 13, lines 20-24).

In regards to Claim 40, Peleg discloses the imaging system of Claim 39, wherein a set of first combined panoramic images and a set of second combined panoramic images are displayed in sequence to provide a stereoscopic, panoramic motion picture (column 13, lines 20-24 and lines 44-47).

24. In regards to claim 41, Peleg discloses an imaging system comprising: an image capture unit to provide an image (Figure 6 discloses an image capture unit, as broadly as claimed, to provide an image. It is noted that the specification does not support an interpretation other than a resultant image, in other words, according to the specification, the broadly stated "image capture unit" is made of a plurality of image capture devices which supply a plurality of images which, when taken in combination results in an "image capture unit" which "provides an image." Stated another way, the specification does not disclose a single image capture device [camera or the like] which

provides a single image where this **single image** provides a first monoscopic image and a second monoscopic image. The specification does, however, disclose a plurality of cameras which provide overlapping images which are manipulated to form monoscopic images. Further, Peleg does disclose where a single image capture device [camera] is disposed to capture multiple image portion and provide two monoscopic images [column 4, lines 30-39].); and a processing unit coupled to the image capture unit to receive a first portion of said image to provide a first monoscopic image (Figure 2, Item 12 discloses the "panorama mosaic image generator"; column 8, lines 20-22 and Figure 5, Item 106 discloses the "panorama mosaic image generator" to manipulate the "image portions" captured by the image capture device to produce a first monoscopic image, i.e., the left panoramic image)-and to receive a second portion of said image to provide a second monoscopic image (Figure 2, Item 12 discloses the "panorama mosaic image generator"; column 8, lines 20-22 and Figure 5, Item 106 discloses the "panorama mosaic image generator" to manipulate the "image portions" captured by the image capture device to produce a second monoscopic image, i.e., the right panoramic image).

25. In regards to claim 42, Peleg discloses the imaging system of claim 41, as contained hereinabove. In addition, Peleg discloses the imaging system further comprising means for displaying said first monoscopic image and said second monoscopic image as a stereoscopic image (column 2, lines 47-50 and column 4, lines 28-39).

26. In regards to claim 43, Peleg discloses further comprising a plurality of image capture units coupled to the processing unit (Figure 6 and column 8, lines 31-35), the plurality of image capture units to provide a plurality of images (Figure 6 and column 8, lines 31-35 where the plurality of image correlate to the left image and the right image), wherein selected ones of the plurality of images are combined with at least one other image to produce a plurality of combined images (column 8, lines 4-22 where the plurality of images are mosaiced "using any convenient mosaicing technique"), wherein the plurality of combined images are combined to provide a first panoramic image and a second panoramic image (column 8, lines 13-20), and wherein the first panoramic image and the second panoramic image are combined to provide a panoramic, stereoscopic image (column 4, lines 30-39).

27. In regards to Claim 44, Peleg discloses the imaging system of Claim 43, as contained hereinabove. In addition, Peleg discloses various embodiments where said first panoramic image displays about 90 degrees of a scene (Figures 10-11 and, in particular, Figure 9).

28. In regards to Claim 45, Peleg discloses the imaging system of Claim 4, as disclosed hereinabove. In addition, Peleg discloses wherein said panoramic, stereoscopic image displays about 180 degrees of a scene (column 10, lines 55-60 disclose an embodiment for displaying an image "up to approximately 180 degrees").

29. In regards to claim 46, Peleg discloses the imaging system of claim 43, as disclosed hereinabove. In addition, Peleg discloses the system further comprising a

means to display the panoramic, stereoscopic image couple to the processing unit (column 2, lines 46-58; Figure 11).

30. In regards to Claim 49, Peleg discloses the method of Claim 27 wherein each stereoscopic image that comprises the stereoscopic motion picture forms a portion of a 360 degree panoramic stereoscopic image (Figure 4 and column 10, line 61 through column 11, line 14 discloses each stereoscopic image pair as forming a portion of a 360 degree panoramic stereoscopic image; column 13, lines 21-24 disclose the image display as a stereoscopic, panoramic motion picture).

31. In regards to Claim 51, Peleg discloses the imaging system of Claim 40, wherein the moving stereoscopic, panoramic image forms a portion of a 360 degree panoramic, stereoscopic image (Figure 4 and column 10, line 61 through column 11, line 14 discloses each stereoscopic image pair as forming a portion of a 360 degree panoramic stereoscopic image; column 13, lines 21-24 disclose the image display as a stereoscopic, panoramic motion picture).

32. In regards to Claim 54, Peleg discloses the method of Claim 27, wherein said stereoscopic, panoramic image displays about 360 degrees of a scene, as disclosed hereinabove in regards to Claims 28 and 49.

33. In regards to Claim 55, Peleg discloses the imaging system of Claim 30, wherein said first combined image is combined with a sufficient plurality of images to produce a first combined panoramic image, representing a 360 degree panoramic monoscopic image, and wherein the second combined image is combined with a sufficient plurality of other images to produce a second combined panoramic image, representing a 360

degree panoramic monoscopic image (column 6, lines 20-42 disclose the mosaicing of images [which corresponds to the description in applicant's specification on page 6] such that a first combined image set [corresponding to the left image portion] and a second combined image set [corresponding to the right eye view] a generated from a sufficient plurality of images and the combinations represent a 360 degree panoramic, monoscopic image; see also column 8, lines 20-64 and column 10, lines 61-66), and wherein said first combined panoramic image and said second combined panoramic image are displayed to provide a stereoscopic panoramic image (column 11, lines 38-42).

34. In regards to Claim 56, Peleg disclose the imaging system of Claim 55, wherein said stereoscopic, panoramic image forms a portion of a 360 degree panoramic stereoscopic image (column 11, lines 38-42 and column 10, lines 61-66).

35. In regards to Claim 57, Peleg discloses the imaging system of Claim 42, as contained hereinabove. Peleg further discloses wherein said panoramic stereoscopic image forms a portion of a 360 degree panoramic stereoscopic image (Figure 6 and column 8, lines 61-66 disclose where the panoramic, stereoscopic iamge forms the entirety of the 360 degree panoramic stereoscopic image).

36. In regards to Claim 58, Peleg discloses the imaging system of Claim 43, as contained hereinabove. Peleg further discloses wherein said panoramic, stereoscopic image displays about 360 degrees of a scene (Figure 6 and column 8, lines 61-66).

Art Unit: 2676

37. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

38. Claims 1-15, 18-21, 47-48 and 52-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCutchen (5,023,725) in view of Pritch et al. ("Automatic Disparity Control in Stereo Panoramas (OmniStereo)," Omnidirectional Vision, 2000, Proceedings. IEEE Workshop on 12 June 2000).

39. In regards to claim 1, McCutchen discloses an imaging system comprised of:

- a first image capture device, a second image capture device, a third image capture device (Figures 2 shows six separate image capture device planes; Figure 20, column 14, lines 22-25, and column 21, lines 1-13 disclose twelve image capture devices – or camera modules – linked together to cover an entire spherical field of view; Figure 21 and column 21, lines 14-33 disclose the use of six image capture devices – or camera modules – linked together to cover an entire hemisphere)
- means for combining at least a first portion of a first image captured with said first image capture device with a portion of a second image captured with said second image capture device, to produce a first combined image (Figure 24, column 21, lines 51-68 and column 22, lines 1-29 disclose the use of electro-optical lenses to extract three screens within one image



capture device where each screen covers the area equivalent to one section of a dodecahedrically divided sphere. It is further disclosed that one-third, e.g. Item 194 of Figure 24, of the captured image is overlapping a first adjacent image and another one-third, e.g. Item 195 of Figure 24, is overlapping a second adjacent image. In the disclosed invention, each image capture device is capable of extracting three screens and then overlapping one-third with a first adjacent image and another one-third with a second adjacent image.)

- means for combining at least a second portion of said first image with at least a portion of a third image captured with said third image capture device to produce a second combined image (Figure 24, column 21, lines 51-68 and column 22, lines 1-29 disclose the use of electro-optical lenses to extract three screens within one image capture device where each screen covers the area equivalent to one section of a dodecahedrically divided sphere. It is further disclosed that one-third, e.g. Item 194 of Figure 24, of the captured image is overlapping a first adjacent image and another one-third, e.g. Item 195 of Figure 24, is overlapping a second adjacent image. In the disclosed invention, each image capture device is capable of extracting three screens and then overlapping one-third with a first adjacent image and another one-third with a second adjacent image.)
- said second combined image does not comprise a majority of said first portion of said first image (Figure 24, column 21, lines 51-68 and column

22, lines 1-29 disclose a device where the second combined image is overlapped by a portion of a first image, e.g. Item 195 of Figure 24, and the first portion of said first image is exemplified by Item 194 of Figure 24 wherein Item 195 does not comprise a majority of Item 194)

While McCutchen does disclose the combination of images, as broadly as claimed, McCutchen does not specifically disclose the first combined image and second combined image as argued by applicant where the combined images are captured images. In other words, McCutchen does capture a first, second, and third image and combine these images, as broadly as claimed, to provide a first combined display image and a second combined display image; however, McCutchen provides the combination in the display and not in the capture portion of the processing. Pritch discloses the combination of captured images such that a portion of a first image is combined with a portion of the second image and a portion of the first image is combined with a portion of a third image for the purpose of generating two distinct images (page 54, first paragraph under Abstract discloses the generation of two distinct panoramic images which, when combined, produce a stereoscopic, panoramic image; Figure 5 discloses a first image followed by a series of images the last one of which would inherently overlap the first and, therefore be the equivalent of the third image disclosed by applicant and where the first panoramic image and second panoramic image are the left-eye projection and the right-eye projection of the same images combined with subsequent images such that the portion of the first image combined with the third image would generate a portion of the right-eye strip and the first image combined with the second

image would form a portion of the left-eye strip; while Pritch discloses two image capture devices each capturing subsequent images while rotating around a cylindrical base and, in an alternate embodiment, a single camera rotating around a cylindrical base capturing subsequent images, it is noted that this is functionally equivalent to a series of individual cameras as disclosed by applicant). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of McCutchen and Pritch to achieve a method for panoramic, stereoscopic image in order to provide the ultimate immersive visual environment and because both systems are for the obtaining and combining of multiple images to generate a new image (e.g., stereoscopic or panoramic image).

40. In regards to claim 2, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 17 of the non-final rejection are incorporated herein in regards to claim 2.

41. In regards to claim 3, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 18 of the non-final rejection are incorporated herein in regards to claim 3.

42. In regards to claim 4, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 19 of the non-final rejection are incorporated herein in regards to claim 4.

43. In regards to claim 5, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 20 of the non-final rejection are incorporated herein in regards to claim 5.

44. In regards to claim 6, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 21 of the non-final rejection are incorporated herein in regards to claim 6.

45. In regards to claim 7, the combination of McCutchen and Pritch disclose the image capture device of claim 6, as contained hereinabove. In addition, the statements advanced in paragraph 22 of the non-final rejection are incorporated herein in regards to claim 7.

46. In regards to claim 8, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 23 of the non-final rejection are incorporated herein in regards to claim 8.

47. In regards to claim 9, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 24 of the non-final rejection are incorporated herein in regards to claim 9.

48. In regards to claim 10, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements

advanced in paragraph 25 of the non-final rejection are incorporated herein in regards to claim 10.

49. In regards to claim 11, the combination of McCutchen and Pritch disclose the image capture device of claim 6, as contained hereinabove. In addition, the statements advanced in paragraph 26 of the non-final rejection are incorporated herein in regards to claim 11.

50. In regards to claim 12, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 27 of the non-final rejection are incorporated herein in regards to claim 12.

51. In regards to claim 13, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 28 of the non-final rejection are incorporated herein in regards to claim 13.

52. In regards to claim 14, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 29 of the non-final rejection are incorporated herein in regards to claim 14.

53. In regards to claim 15, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 30 of the non-final rejection are incorporated herein in regards to claim 15.

54. In regards to claim 18, the combination of McCutchen and Pritch disclose the image capture device of claim 1, as contained hereinabove. In addition, the statements advanced in paragraph 31 of the non-final rejection are incorporated herein in regards to claim 18.

55. In regards to Claim 19, McCutchen discloses an imaging system comprising:

- a first image capture device having a first orientation (Figures 2 shows six separate image capture device planes where each image capture device has a distinctly different orientation as exemplified by Item 53 and the plurality of other, unlabeled axis. Figure 3 and column 11, lines 38-51 disclose a hemispherical embodiment of the disclosed invention where six, individual and separately oriented image capture devices are utilized.)
- a second image capture device having a second orientation different from said first orientation (Figures 2 shows six separate image capture device planes where each image capture device has a distinctly different orientation as exemplified by Item 53 and the plurality of other, unlabeled axis. Figure 3 and column 11, lines 38-51 disclose a hemispherical embodiment of the disclosed invention where six, individual and separately oriented image capture devices are utilized and where the second image capture device would have a second orientation different from said first orientation.)

- a third image capture device having a third orientation different from said second orientation (Figures 2 shows six separate image capture device planes where each image capture device has a distinctly different orientation as exemplified by Item 53 and the plurality of other, unlabeled axis. Figure 3 and column 11, lines 38-51 disclose a hemispherical embodiment of the disclosed invention where six, individual and separately oriented image capture devices are utilized and where the third image capture device would have a third orientation different from said second orientation.)
- a fourth image capture device having a fourth orientation different from said third orientation (Figures 2 shows six separate image capture device planes where each image capture device has a distinctly different orientation as exemplified by Item 53 and the plurality of other, unlabeled axis. Figure 3 and column 11, lines 38-51 disclose a hemispherical embodiment of the disclosed invention where six, individual and separately oriented image capture devices are utilized and where the fourth image capture device would have a fourth orientation different from said third orientation.)
- means for combining a first image captured with said first image capture device with a second image captured with said second image capture device to produce a first combined image (Figure 24, column 21, lines 51-68 and column 22, lines 1-29 disclose the use of electro-optical

lenses to extract three screens within one image capture device wherein each screen covers the area equivalent to one section of a dodecahedrically divided sphere. It is further disclosed that one-third of the captured image, e.g. Item 194 of Figure 24, is overlapping a second image produced by a second image capture device to produce a first combined image.)

- means for combining a third image captured with said third image capture device with a fourth image captured with said fourth image capture device to produce a second combined image (Figure 24, column 21, lines 51-68 and column 22, lines 1-29 disclose the use of electro-optical lenses to extract three screens within one image capture device wherein each screen covers the area equivalent to one section of a dodecahedrically divided sphere. It is further disclosed that one-third of the captured image is overlapping a first adjacent image and another one-third is overlapping a second adjacent image. In the disclosed invention, there are six image capture devices with each image capture device capable of extracting three screens and then overlapping one-third with a first adjacent image and another one-third with a second adjacent image where the third image capture device would overlap a portion of a third image with a portion of a fourth image captured by a fourth image capture device.)



While McCutchen does disclose the combination of images, as broadly as claimed, McCutchen does not specifically disclose the first combined image and second combined image as argued by applicant where the combined images are captured images. In other words, McCutchen does capture a first, second, third and fourth image and combine these images, as broadly as claimed, to provide a first combined display image and a second combined display image; however, McCutchen provides the combination in the display and not in the capture portion of the processing. Pritch discloses the combination of captured images such that a portion of a first image is combined with a portion of the second image and a portion of the third image is combined with a portion of a fourth image for the purpose of generating two distinct images (page 54, first paragraph under Abstract discloses the generation of two distinct panoramic images which, when combined, produce a stereoscopic, panoramic image; Figure 5 discloses a first image followed by a series of images the last one of which would inherently overlap the first and where the first panoramic image and second panoramic image are the left-eye projection and the right-eye projection of the same images combined with subsequent images such that the portion of the first image combined with the second image would generate a portion of the right-eye strip and the third image combined with the fourth image would form a portion of the left-eye strip; while Pritch discloses two image capture devices each capturing subsequent images while rotating around a cylindrical base and, in an alternate embodiment, a single camera rotating around a cylindrical base capturing subsequent images, it is noted that this is functionally equivalent to a series of individual cameras around a cylindrical base

as disclosed by applicant because both provide the same type of plural images). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of McCutchen and Pritch to achieve a method for panoramic, stereoscopic image in order to provide the ultimate immersive visual environment.

56. In regards to claim 20, the combination of McCutchen and Pritch disclose the image capture device of claim 19, as contained hereinabove. In addition, the statements advanced in paragraph 41 of the non-final rejection are incorporated herein in regards to claim 20.

57. In regards to claim 21, the combination of McCutchen and Pritch disclose the image capture device of claim 19, as contained hereinabove. In addition, the statements advanced in paragraph 42 of the non-final rejection are incorporated herein in regards to claim 21.

58. In regards to claim 47, the combination of McCutchen and Pritch disclose the image capture device of claim 7, as contained hereinabove. While applicant has amended the claim dependency such that claim 47 is no longer dependent on claim 7 but is now dependent on claim 13, the statements advanced in paragraph 22 of the non-final rejection are still applicable and are incorporated herein in regards to claim 47.

59. In regards to Claim 48, the combination of McCutchen and Pritch discloses the imaging system of Claim 20, as contained hereinabove. In addition, McCutchen discloses wherein at least one of a first or second combined image forms a portion of a 360 degree panoramic stereoscopic image. (Figure 19, Figure 24 and column 20, lines

62-68 disclose that, through the use of electro-optical lenses to create overlapping images, the system "would therefore be capable of realistic, nearly omnidirectional stereoscopic" image generation of which the first and second combined images would form a portion.)

60. In regards to claim 52, the combination of McCutchen and Pritch disclose the image capture device of claim 14, as contained hereinabove. In addition, the statements advanced in paragraph 37 of the non-final rejection are incorporated herein in regards to claim 52.

61. In regards to claim 53, the combination of McCutchen and Pritch disclose the image capture device of claim 15, as contained hereinabove. In addition, the statements advanced in paragraph 38 of the non-final rejection are incorporated herein in regards to claim 53.

62. Claims 16, 17, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCutchen (5,023,725) in view of Pritch et al. ("Automatic Disparity Control in Stereo Panoramas (OmniStereo)," Omnidirectional Vision, 2000, Proceedings. IEEE Workshop on 12 June 2000) and in further view of Peleg et al. (6,665,003).

63. In regards to Claim 16, the combination of McCutchen and Pritch disclose the imaging system of Claim 14, as contained hereinabove. While the combination discloses the first and second set of combined panoramic images, the combination does not specifically disclose the display of the first and second set of combined panoramic

images in succession, in a manner which produces a succession of visual information. Peleg discloses an imaging system for the generation and display of stereographic, panoramic images such that a first and second combination of images are displayed in succession (column 11, lines 10-14, 38-42; column 13, lines 20-24 and 44-47). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of McCutchen, Pritch, and Peleg to achieve a system for generating and displaying panoramic, stereoscopic images wherein such images are displayed in succession in order to produce a panoramic, stereoscopic motion picture.

64. In regards to Claim 17, the combination of McCutchen and Pritch disclose the imaging system of Claim 14, as contained hereinabove. While the combination discloses the first and second set of combined panoramic images, the combination does not specifically disclose the display of the first and second set of combined panoramic images in succession, in a manner which produces a succession of visual information. Peleg discloses an imaging system for the generation and display of stereographic, panoramic images such that a first and second combination of images are displayed in succession (column 11, lines 10-14, 38-42; column 13, lines 20-24 and 44-47). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of McCutchen, Pritch, and Peleg to achieve a system for generating and displaying panoramic, stereoscopic images wherein such images are displayed in succession in order to produce a panoramic, stereoscopic motion picture.

65. In regards to Claim 22, the combination of McCutchen and Pritch disclose the imaging system of Claim 19, as disclosed hereinabove. While the combination discloses the combination of images, the combination does not specifically disclose the first combination (of two single images as disclosed in claim 19) as representing at least about 300 degrees of a scene. Peleg discloses an imaging system for the generation and display of stereographic, panoramic images such that a first combination of images represents at least about 300 degrees of a scene (column 10, line 55-60 discloses a camera having the ability for "recording of an image of a scene that subtends a relatively wide angled arc, generally up to approximately 180 degrees" where the combination of two such images would produce a combination of at least about 300 degrees of a scene). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of McCutchen, Pritch, and Peleg to achieve a system for generating and displaying panoramic, stereoscopic images wherein such images are obtainable using a fewer number of cameras.

66. Claims 25, 33, and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peleg et al. (6,665,003).

67. In regards to Claim 25, Peleg discloses the method of Claim 24, as contained hereinabove. While Peleg discloses the plurality of points and discloses them formed about an arcuate line, Peleg does not specifically disclose wherein said plurality of points are greater than about five degrees apart and less than about forty-five degrees

apart. However, Peleg discloses 8 cameras positioned uniformly around a circle such that the plurality of points would be about 45 degrees apart. It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings and that which is obvious to achieve a method of capturing images such that the plurality of points are greater than about five degrees apart and less than about forty-five degrees apart in order to provide a sufficient number of images for image mosaicing.

68. In regards to Claim 33, Peleg discloses the imaging system of Claim 30, wherein said first and said second image capture units are separated from each other by an angular distance of about 5 degrees to about 45 degrees along an arc, and wherein said second and said third image capture units are separated from each other by about the angular distance along an arc, as disclosed hereinabove in regards to claim 25.

69. In regards to Claim 35, Peleg discloses the imaging system of claim 34 as contained hereinabove. In addition, Peleg disclose wherein the overlap amount is about 10 percent to about 90 percent (column 6, lines 20-30 where it is disclosed there are "N" number of image recorded and where "N" is an integer. Peleg places no other parameters on this number "N" except that it is greater than is sufficient to generate panoramic, stereoscopic image which implies at least two [column 8, lines 49-64 and column 10, lines 55-66 disclose alternate embodiments]; therefore, based upon the number of cameras, which is clearly a design choice, the overlap region would be about 10 percent to about 90 percent).

70. In regards to Claim 36, Peleg discloses the imaging system of Claim 30, as contained hereinabove. In addition, Peleg discloses wherein a defined image plane associated with said first image capture unit overlaps a defined image plane associated with said second image capture unit by about 1 to about 20 percent (column 6, lines 20-30 where it is disclosed there are "N" number of image recorded and where "N" is an integer. Peleg places no other parameters on this number "N" except that it is greater than is sufficient to generate panoramic, stereoscopic image which implies at least two [column 8, lines 49-64 and column 10, lines 55-66 disclose alternate embodiments]; therefore, based upon the number of cameras, which is clearly a design choice, the defined image plane associated with said first image capture unit overlaps a defined image plane associated with said second image capture unit by about 1 to about 20 percent; see also Figure 4).

71. In regards to Claim 37, Peleg discloses the imaging system of Claim 30, as contained hereinabove. In addition, Peleg discloses wherein said first portion of said first image is between about 20 percent and about 80 percent of said first image, and wherein said portion of said second image is between about 20 percent and about 80 percent of said second image (column 6, lines 20-30 where it is disclosed there are "N" number of image recorded and where "N" is an integer. Peleg places no other parameters on this number "N" except that it is greater than is sufficient to generate panoramic, stereoscopic image which implies at least two [column 8, lines 49-64 and column 10, lines 55-66 disclose alternate embodiments]; therefore, based upon the number of cameras, which is clearly a design choice, said first portion of said first image

is between about 20 percent and about 80 percent of said first image, and wherein said portion of said second image is between about 20 percent and about 80 percent of said second image).

72. Claims 26, 39, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peleg et al. (6,665,003) in view of Pritch et al. ("Automatic Disparity Control in Stereo Panoramas (OmniStereo)," Omnidirectional Vision, 2000, Proceedings. IEEE Workshop on 12 June 2000).

73. In regards to Claim 26, Peleg discloses the method of Claim 24, as contained hereinabove. While Peleg discloses a more generic variation of his invention such that there are "N" number of cameras providing "N"-number of images (column 8; lines 49-64), Peleg does not specifically disclose wherein said the plurality of points is greater than about ten degrees apart and less than about twenty degrees apart. Pritch discloses a method for producing stereo panoramas using a method of stitching such that 24 images are stitched together to form right and left plane panoramic images (Figure 5 discloses the 24 images) and where the generation of 24 images using 24 cameras spaced equally apart on an arcuate line would produce points at approximately 15 degrees apart. It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of Peleg and Pritch such that a method for producing combined images where the plurality of points from which the images are achieved are greater than about ten degrees apart and less



than about twenty degrees apart in order to generate sufficient images to provide a panoramic view.

74. In regards to Claim 39, Peleg discloses the imaging system of Claim 30, as contained hereinabove. Peleg further discloses the first combined image is combined with a sufficient plurality of images to produce a first combined panoramic image and the second combined image is combined with a sufficient plurality of other images to produce a second combined panoramic image (column 6, lines 20-51). In addition, Peleg discloses wherein said first combined panoramic image and said second combined panoramic image are displayed to provide a stereoscopic, panoramic image (column 11, lines 38-42). However, Peleg does not specifically disclose wherein the first plurality of combined images and the second plurality of combined images represent about 90 degrees of a scene. Pritch discloses a method for producing stereo panoramas using a method of stitching such as that disclosed by Peleg. In addition, Pritch discloses the system as able to represent specific degrees of a scene, i.e., 90 degrees of a scene (Figure 5 discloses 180 and 360 degrees where 90 is an easily divided portion of either one of these). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of Peleg and Pritch to achieve a system where a set of first combined images and a set of second combined images each represent about 90 degrees of a scene in order to generate sufficient images to provide a panoramic, stereoscopic image of about 90 degrees of a scene.

75. In regards to Claim 50, the combination of Peleg and Pritch discloses the imaging system of claim 39, wherein the stereoscopic, panoramic image forms a portion of a 360 degree panoramic stereoscopic image (Peleg: Figure 4 and column 10, line 61 through column 11, line 14 discloses each stereoscopic image pair as forming a portion of a 360 degree panoramic stereoscopic image).

76. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peleg et al. (6,665,003) in view of Shum et al. (6,469,710).

77. In regards to Claim 29, Peleg discloses the method of Claim 23, as contained hereinabove. While Peleg discloses the merging of images, Peleg does not specifically disclose the feathering of overlapping edges of an image buffer by degrading visibility of pixels in an overlap area prior to merging the image into the first combined image. Shum discloses a method for combining multiple images using a method of weighted pyramid blending, i.e., feathering, prior to merging the images into a first combined image, as broadly as claimed (Figure 5A discloses the steps and order of the feathering process; column 9, lines 13 through column 10, line 26). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of Peleg and Shum to achieve a method for merging images where "feathering" is performed prior to the merge in order to preserve information prior to merging and prevent "bleeding."

78. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peleg et al. (6,665,003) in view of McCutchen (5,023,725).

79. In regards to Claim 32, Peleg discloses the imaging system of Claim 31, as disclosed hereinabove. While Peleg discloses the imaging system having a plurality of points about a substantially arcuate path, Peleg does not specifically disclose wherein said substantially arcuate path is defined by a substantially spherical body. McCutchen discloses an imaging system for recording and displaying panoramic, stereoscopic images where there are a plurality of cameras placed about a substantially arcuate path and where said substantially arcuate path is defined by a substantially spherical body (Figures 2, 3, 4, 19, 20, 31 and column 11, lines 52-57 disclose the imaging system as having a substantially spherical body around which the image capture devices are placed). It would have been obvious to one skilled in the art to which it pertains at the time the invention was made to integrate the teachings of Peleg and McCutchen to achieve a system having a plurality of image capture devices and where those image capture devices are placed on an arcuate path and where arcuate path is defined by a substantially spherical body in order to provide a system capable of recording a nearly omnidirectional panoramic, stereoscopic image.

### ***Conclusion***

80. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alysa N. Brautigam whose telephone number is 703-305-8631. The examiner can normally be reached on 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on 703-305-3885. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

anb



JOSEPH MANCUSO  
PRIMARY EXAMINER